SILAGE DECISIONS FACTSHEET

HOW GRASS GROWS

After sowing grass seed the seedling germinates and the first leaf appears. Each new leaf grows up encircled by the last one. The oldest leaf always on the outside and the young expanding leaves in the centre. While this gives the appearance of a stem, it is not the true stem. In grasses such as ryegrass the true stem is at the very base of the plant at ground level and escapes the grazing animal. It will stay dormant as long as the plant remains vegetative.

The seedling plant develops to produce 5-6 live leaves. But this falls to a constant number of live leaves, for the main shoot and each tiller (potential new plant) produced, depending on the species. Ryegrass will have 3 live leaves on the main shoot and each tiller. Leaves continue to be produced, but as each new leaf appears the oldest one dies. The rate of appearance varies between species, but ryegrass leaves typically appear every 11 days, so each leaf lives for 33 days.

Tillering

Grass plants have the ability to produce tillers. Tillering continues until plants come into contact with each other. Once all the gaps have been filled the plants have to compete for resourses, such as soil nutrients and light and the rate of tiller development is reduced. As time passes, older plants become detached from newer tillers and they eventually die. Each tiller will live for about 1 year.

The size and number of tillers/m^2 will vary depending on management. A ryegrass sward under infrequent defoliation eg, rotational dairy system, will have about 10,000 large tillers/m^2, but a sward intensively grazed at 4cm by sheep could have 40,000 tillers/m^2. Although the structure of these two swards are different the total dry matter production is similar.

Flowering

Most grasses must experience winter conditions of low temperatures and short day lengths to trigger the mechanisms for seed production. Early flowering ryegrasses are sensitive to March/April temperatures and late heading varieties to April/May temperatures. Once the plant produces the true reproductive stem the production of leaves ceases.

Factors affecting leaf and tiller production.

There are a number of factors affecting leaf and tiller production, but temperature, light, water and nitrogen are the most influencial:

Temperature: Grass growth begins at 5^0C . An increase in temperature up to 25^0C increases the rate of leaf appearance as well as the rate of leaf extension. In mid summer a new leaf can appear every 7 days but in mid winter this can be as long as 35 days. The production of new leaves is faster at higher temperatures as is the

production of new tillers and the greater the chance of sward survival. Optimum growth is achieved between 20-25^{0}C with night time temperatures equal or only slightly lower. Sustained periods of higher temperatures will eventually decrease growth rates. Leaves will also grow faster in spring than at the same temperature in autumn.

Light: is essential for providing energy through photosynthesis. It enables the plant to create new cells and increase cell size that leads to leaf expansion on every tiller. During short periods of poor light and reduced levels of photosynthesis the plant uses reserves stored in the leaves and base to buffer these short term fluctuations.

Water: the speed of leaf growth is a sensitive indicator of water stress. Water stress occurs when the evaporation of water through the leaves is faster than the rate of uptake from the soil. Leaf expansion is first restricted during day time hours when the evaporative demand is at its highest. During a dry period, plant cells continue to be formed, but they need water to expand. When the rain comes these cells expand quickly, so growth after drought is very fast.

Nitrogen: is a very effective stimulant to grass growth, because it increases both leaf production and photosynthesis. The faster the leaves grow the more light they can use. Nitrogen will increase the speed at which the sward thickens up, by building up tiller numbers. This only takes effect when sward heights are managed at lower levels. It can have the opposite effect by reducing the number of tillers if the grass grows too high and competes for light, as self thinning will occur. This is the consequence of long close up periods for silage.

Facsheet produced by the **IGER GRASSLAND DEVELOPMENT CENTRE**
Institute of Grassland & Environmental Research, Plas Gogerddan,
Aberystwyth, Ceredigion SY23 3EB. Phone: 01970 823000

Further information is available in Grass: Its Production and Utilisation, Third Edition, edited by Alan Hopkins and published for the British Grassland Society by Blackwells Science.